

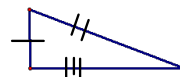
4.1 Apply Triangle Sum Properties

Classify Triangles

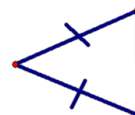
- By Sides
- By Angles

By Sides

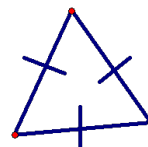
- Scalene
- No congruent sides



- Isosceles
- 2 congruent sides

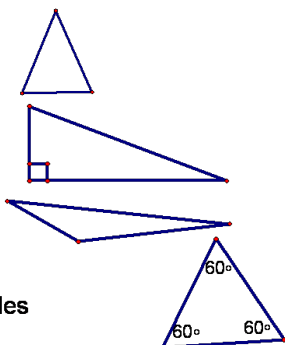


- Equilateral
- 3 congruent sides



By Angles

- Acute
 - 3 acute angles
- Right
 - 1 right angle
- Obtuse
 - 1 obtuse angle
- Equiangular
 - 3 congruent angles



Example

Classify the triangle by sides.

 $\triangle ABC$ A(-5, -2) B(1, 4) C(1, -2)

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$AB = \sqrt{(-5 - 1)^2 + (-2 - 4)^2} = \sqrt{64 + 36} = \sqrt{100} = 10$$

$$BC = \sqrt{(1 - 1)^2 + (4 - (-2))^2} = \sqrt{0 + 36} = \sqrt{36} = 6$$

$$AC = \sqrt{(-5 - 1)^2 + (-2 - (-2))^2} = \sqrt{36 + 0} = \sqrt{36} = 6$$

Is it a right triangle?

yes

isosceles

Is $\overline{BC} \perp \overline{AC}$?
 $m = \frac{-6}{0}$ undef $m = 0$ not

Example

Classify the triangle by sides.

$\triangle AMY$ A(-3, 4) M(3, 1) Y(0, -2)

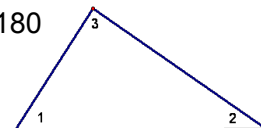
$$\begin{aligned} AM &= \sqrt{45} & \sqrt{45} \\ MY &= \sqrt{18} \\ AY &= \sqrt{45} & \text{Isosceles} \end{aligned}$$

Is it a right triangle? *no*

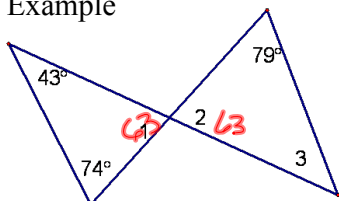
Theorem 4.1—Triangle Sum

Theorem—the sum of the measures of the angles of a triangle is 180 degrees

$$m\angle 1 + m\angle 2 + m\angle 3 = 180$$

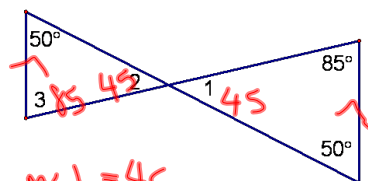


Example



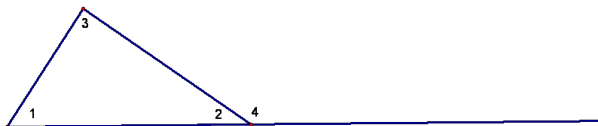
$$\begin{aligned} m\angle 1 &= 63 \\ m\angle 2 &= 63 \\ m\angle 3 &= 38 \end{aligned}$$

Example



$$\begin{aligned} m\angle 1 &= 45 \\ m\angle 2 &= 45 \end{aligned}$$

What is $\angle 1 + \angle 2 + \angle 3$ to 180?

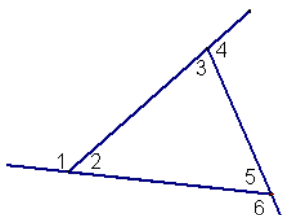


$$\begin{aligned} m\angle 1 + m\angle 2 + m\angle 3 &= 180 \\ 180 &= m\angle 2 + m\angle 4 \\ m\angle 1 + \cancel{m\angle 2} + m\angle 3 &= \cancel{m\angle 2} + m\angle 4 \\ m\angle 1 + m\angle 3 &= m\angle 4 \end{aligned}$$

Theorem 4.2—Exterior Angle Theorem—The measure of an exterior angle of a triangle = the sum of the 2 remote interior angles.

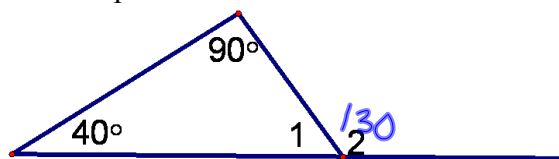


$$m\angle 1 + m\angle 3 = m\angle 4$$



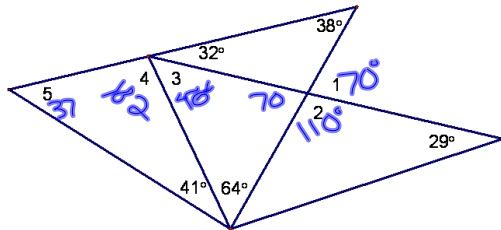
$$\begin{aligned} m\angle 1 &= m\angle 3 + m\angle 5 \\ m\angle 4 &= m\angle 2 + m\angle 5 \\ m\angle 6 &= m\angle 2 + m\angle 3 \end{aligned}$$

Example



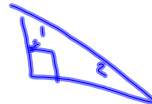
$$\begin{aligned} m\angle 2 &= 90 + 40 = 130 \\ m\angle 1 &= 50 \end{aligned}$$

Find the measures of the numbered angles.



Corollary- Statement that can be easily proven

Corollary —The acute angles of a right triangle are complementary



$\angle 1 + \angle 2$ are compl.

Homework

- p. 221-222 #s 1-11, 17-19, 21-26, 32-34